

AMENDMENTS TO THE CLAIMS:

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1. (Currently Amended) An aqueous acidic solution that provides a black chromate conversion coating on zinc and zinc alloys comprising:

trivalent chromium ions in a concentration of about 0.02M to about 0.2M;
phosphorous anions;

anions selected from the group of sulfate ions, nitrate ions, and combinations thereof;

at least one transition metal or metalloid selected from groups III, IVa, Va, or VIII;

an organic chelate selected from the group consisting of carboxylic acids, polycarboxylic acids, and combinations thereof,

wherein a concentration of said sulfate ions when present comprise about 0.02 to about 0.5M and a concentration of said nitrate ions when present comprise about 0.06 to about 0.6M; and

wherein the organic chelate is present in a concentration of from about 0.02M to about 0.3M; and

wherein said aqueous acidic solution provides a black chromate conversion coating in a single layer.

2. (Original) The solution of claim 1, wherein the concentration of trivalent chromium ions is from about 0.03M to about 0.07M.

3. (Original) The solution of claim 1, wherein the phosphorous anions are present in a concentration of from about 0.05M to about 0.75M.

4. (Original) The solution of claim 1, wherein the phosphorous anions are provided by phosphorous acids or salts thereof selected from the group consisting of phosphoric acid, mono-sodium phosphate, mono-ammonium phosphate and mixtures thereof.

5. (Original) The solution of claim 1, wherein the solution comprises a transition metal selected from the group consisting of iron, cobalt, nickel, copper and combinations thereof.

6. (Original) The solution of claim 5, wherein the transition metal is present at a concentration of from about 0.005M to about 0.5M.

7. Cancelled.

8. (Original) The solution of claim 1, wherein the organic chelate is a carboxylic acid or polycarboxylic acid selected from the group consisting of citric acid, tartaric acid, malic acid, glyceric acid, lactic acid, glycolic acid, malonic acid, succinic acid, maleic acid, oxalic acid, flutaric acid, and combinations thereof.

9. (Original) The solution of claim 1, wherein the solution has a pH of about 0.5 to about 3.5.

10. Cancelled.

11. Cancelled.

12. Cancelled.

13. Cancelled.

14. Cancelled.

15. Cancelled.

16. Cancelled.

17. Cancelled.

18. Cancelled.

19. (Currently Amended) An acidic chromate solution for forming a black chromate conversion coating comprising:

trivalent chromium ions in a concentration of from about 0.02M to about 0.2M;

phosphorous anions in a concentration of from about 0.05M to about 0.75M;

anions selected from the group consisting of sulfate ions, nitrate ions, and combinations thereof;

a metal selected from the group consisting of iron, cobalt, nickel, copper and combinations thereof;

an organic chelate selected from the group consisting of carboxylic acids and polycarboxylic acids, the organic chelate being present in an amount of from about 0.02M to about 0.3M, and

wherein a concentration of said sulfate ions when present comprise about 0.02 to about 0.5M and a concentration of said nitrate ions when present comprise about 0.06 to about 0.6M; and

wherein said aqueous acidic solution provides a black chromate conversion coating in a single layer.

20. (Currently Amended) An aqueous acidic solution that provides a black chromate conversion coating on zinc and zinc alloys comprising:

trivalent chromium ions in a concentration of about 0.02M to about 0.2M;

phosphorous anions;

anions selected from the group of sulfate ions, nitrate ions, and combinations thereof;

at least one transition metal or metalloid selected from groups III, IVa, Va, or VIII,

wherein a concentration of said sulfate ions when present comprise about 0.02 to about 0.5M and a concentration of said nitrate ions when present comprise about 0.06 to about 0.6M; and

wherein an organic chelate is present in a concentration of from about 0.02M to about 0.3M; and

wherein said aqueous acidic solution provides a black chromate conversion coating in a single layer.

21. (Previously Presented) The solution of claim 1 wherein the phosphorous anions consist of phosphate anions.

22. (Previously Presented) The solution of claim 1 wherein a ratio of the trivalent chromium ions to the at least one transition metal or metalloid ranges from about 0.06:1 to less than 0.5:1.

23. (Previously Presented) The solution of claim 1 wherein the chromate conversion coating is substantially free of hexavalent chromium.